

## Application**brief**

*Eclipse Product:* ThermThief (TFB) Burners & Bayonet-Ultra Recuperators

*Submitted by:* Chuck Carroll (Eclipse Combustion – Shreveport Office)

*Application:* Continuous Annealing Furnace for Tubing

*Description:*



*ThermThief burner and  
Bayonet-Ultra Recuperator  
(See page 2 for more  
photos)*

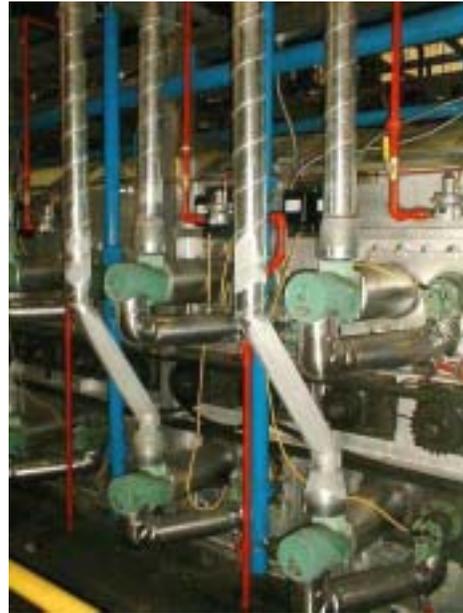
TEK Tube manufactures, amongst other products, steel tubing primarily used in the heat transfer industry. They have a Surface Combustion Roller Hearth Annealing Furnace installed in 1989 that was designed to process 15,000 #/HR of tube using fifty (50) U-Tube Burners configured into three zones of control. The existing Burners were gapped fired using a radiant tube that is 5" ID in the firing leg reducing to 4" ID in the return (exhaust) leg and an effective tube length of approximately 92" (each leg). Their set point in all zones was 1750° F with a desired product temperature of 1650° to 1660°. Thermal Specialties, Inc. of Tulsa, OK is an OEM that uses Eclipse Products and performs burner adjustment and refractory repairs for TEKtube. After natural gas prices soared in 2000/2001 Brian Cole, Manufacturing Mechanical Engineer with TEKtube, contacted Thermal Specialties to discuss possible ways to improve the efficiency of their furnace.

Thermal Specialties has performed several furnace retrofits using Eclipse recuperative Burners and contacted their local Eclipse field sales office to discuss the application. It was decided to propose ThermThief TFB burners used in conjunction with Bayonet-Ultra Recuperators for installation into the existing radiant tubes. Estimated existing Burner efficiency was between 30 and 35% while the proposed TFB/Recupe retrofit was guaranteed to be between 60 and 65% when set up with 15% excess air and 1850° F stack temperature out of the Tubes. The proposal was presented to TEKtube and the decision was made to proceed with the retrofit. It was extremely important that down time be kept to a minimum so Thermal Specialties prefabricated much of the air and gas piping beforehand. The project was started on December 15 and TSI started bringing the furnace back online December 24.

The first month of production occurred in January however the furnace was not online continuously due to other issues not related to the burner retrofit. In January, based upon limited production, their gas usage in terms of btu/lb of production was reduced significantly. Natural gas savings were documented to be \$8690.74. (NOTE: I should have their February production numbers and gas usage shortly which will be much better). According to Mr. Cole, due to the increased firing efficiency, they have been able to reduce their set point on the temperature controllers from 1750° F to 1665° F, much closer to the desired part temperature, and the burners are cycling where before they remained at high fire much of the time. He also stated that the product consistency had been greatly improved. Mr. Cole stated "there will be secondary savings on radiant tubes, refractory and roller life, as well as improved product quality due to more even temperature control."



*Bayonet-Ultra Recuperators provide pre-heated combustion to Eclipse TFB Burners*



*TEK Tube replaced gap fired burners with Eclipse sealed, nozzle-mix TFB Burners and Bayonet-Ultra Recuperators*



*Combustion Air Blowers Located on Top of Furnace*